This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (currently amended) An apparatus for measuring film stack characteristics of a sample, the apparatus comprising:

a beam generator configurable to direct a charged particle beam towards the sample such that the charged particle beam completely penetrates at least two layers of the film stack, wherein a conductive film layer and a liner film layer are two of the at least two layers that are penetrated by the charged particle beam, the charged particle beam causing X-rays to emanate from the sample; and

a first and a second wavelength dispersive X-ray detector positioned above the sample wherein each detector detects X-rays about a different characteristic emission level, wherein the first detector is configured to detect X-rays having characteristic emission levels for a top layer of the film stack and the second detector is configured to detect X-rays having characteristic emission levels for an underlying layer that lies beneath the top layer.

2. (Original) The apparatus as recited in claim 1 wherein the first X-ray detector is configured to detect X-rays of a specific energy level.

Claim 3 (Cancelled)

4. (Original) The apparatus as recited in claim 3 wherein the wavelength dispersive system contains a reflective surface and a sensor, the reflective surface configured to direct X-rays of a predetermined energy level to the sensor.

claims 5-6 (cancelled)

7. (Original) The apparatus as recited in claim 1 further comprising a processor linked to the beam generator and to the first X-ray detector.

8. (Original) The apparatus as recited in claim 7 wherein the processor is configured to control the first X-ray detector so that it detects X-rays of a specific energy level.

9. (Original) The apparatus as recited in claim 7 wherein the processor is configured to control the beam generator so that the charged particle beam directed to the sample penetrates at least a conductive film layer and a liner film layer of the sample.

Claim 10 (Cancelled)

11. (currently amended) A method for measuring at least one characteristic of a film stack on a sample, the method comprising:

directing a charged particle beam towards the sample such that the charged particle beam completely penetrates at least two layers of the film stack, the charged particle beam causing X-rays to emanate from the sample;

detecting X-rays at a first characteristic emission level that represents an emission level for a top layer of the film stack using a first wavelength dispersive X-ray detector that is positioned above the sample; ~~and~~

detecting X-rays at a second characteristic emission level that represents an emission level for an underlying layer of the film stack using a second wavelength dispersive X-ray detector that is positioned above the sample, the underlying layer being a layer of material underneath the top layer;

collecting data resulting from the detected X-rays, wherein the data that is collected is raw data;

selecting a set of estimated film stack characteristic values;

obtaining predicted data by solving equations which model the film stack configuration using the set of estimated film stack characteristic values;

comparing the predicted data against the raw data;

selecting a new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than a predetermined margin of error; and

obtaining a new set of predicted data by solving equations which model the film stack configuration using the new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than the predetermined margin of error.

12. (Original) The method for measuring as recited in claim 11, further comprising configuring the first X-ray detector to detect X-rays of a specific energy level.

Claim 13 (Cancelled)

14. (Original) The method for measuring as recited in claim 13 further comprising positioning a reflective surface contained within the wavelength dispersive system in an orientation to direct X-rays of a predetermined energy level to a sensor contained within the wavelength dispersive system.

Claim 15 (Cancelled)

16. (Original) The method for measuring as recited in claim 11, the method further comprising selecting a charged particle beam energy and a charged particle beam current at which the charged particle beam will be produced.

17. (cancelled)

18. (Original) The method for measuring as recited in claim 11 wherein a conductive film layer and a liner film layer are two of the at least two layers that are penetrated by the charged particle beam.

claims 19-21 (cancelled)

22. (currently amended) The method of determining film stack characteristic values as recited in claim 11 ~~21~~ further comprising recording the set of estimated film stack characteristic values when the difference between the predicted data and the raw ~~collected~~ data is equal to or smaller than the predetermined margin of error, wherein the estimated film stack characteristic values are an acceptable estimate of the film stack's characteristics.

23. (currently amended) The method of determining film stack characteristic values as recited in claim 11 ~~21~~ wherein the raw ~~collected~~ and predicted data represent a count value of X-rays having a specific energy level, the count value being the total number of X-rays received by each of the wavelength dispersive systems over a period of time.

Claims 24-31 (Cancelled)

32. (previously presented) An apparatus as recited in claim 1 wherein each of the characteristic emission levels correspond to a different layer of the film stack.

Claim 33 (Cancelled)

34. (previously presented) A method as recited in claim 11 wherein each of the characteristic emission levels correspond to a different layer of the film stack.

35. (previously presented) An apparatus as recited in claim 1 wherein the charged particle beam completely penetrates the top and the underlying layers of the film stack so that the thickness of the top and the underlying layers can be determined.

36. (previously presented) A method as recited in claim 11 wherein the charged particle beam completely penetrates the thickness of the top and the underlying layers of the film stack so that the thickness of the top and the underlying layers are determined.

37. (currently amended) An apparatus for measuring the thickness of two or more layers within a film stack sample, the apparatus comprising:

a beam generator configurable to direct a charged particle beam towards the sample such that the charged particle beam completely penetrates at least two layers of the film stack, wherein a conductive film layer and a liner film layer are two of the at least two layers that are penetrated by the charged particle beam, the charged particle beam causing X-rays to emanate from the sample; and

a first X-ray detector positioned above the sample so as to detect at least a portion of the X-rays emanating from the sample.

38. (previously presented) An apparatus as recited in claim 37 wherein the first X-ray detector is configured to detect X-rays of a specific energy level.

39. (previously presented) An apparatus as recited in claim 37 wherein the first X-ray detector is a wavelength dispersive system.

40. (previously presented) An apparatus as recited in claim 39 wherein the wavelength dispersive system contains a reflective surface and a sensor, the reflective surface configured to direct X-rays of a predetermined energy level to the sensor.

41. (previously presented) An apparatus as recited in claim 37 further comprising a second X-ray detector, wherein the first and second X-ray detectors are wavelength dispersive systems.

42. (cancelled)